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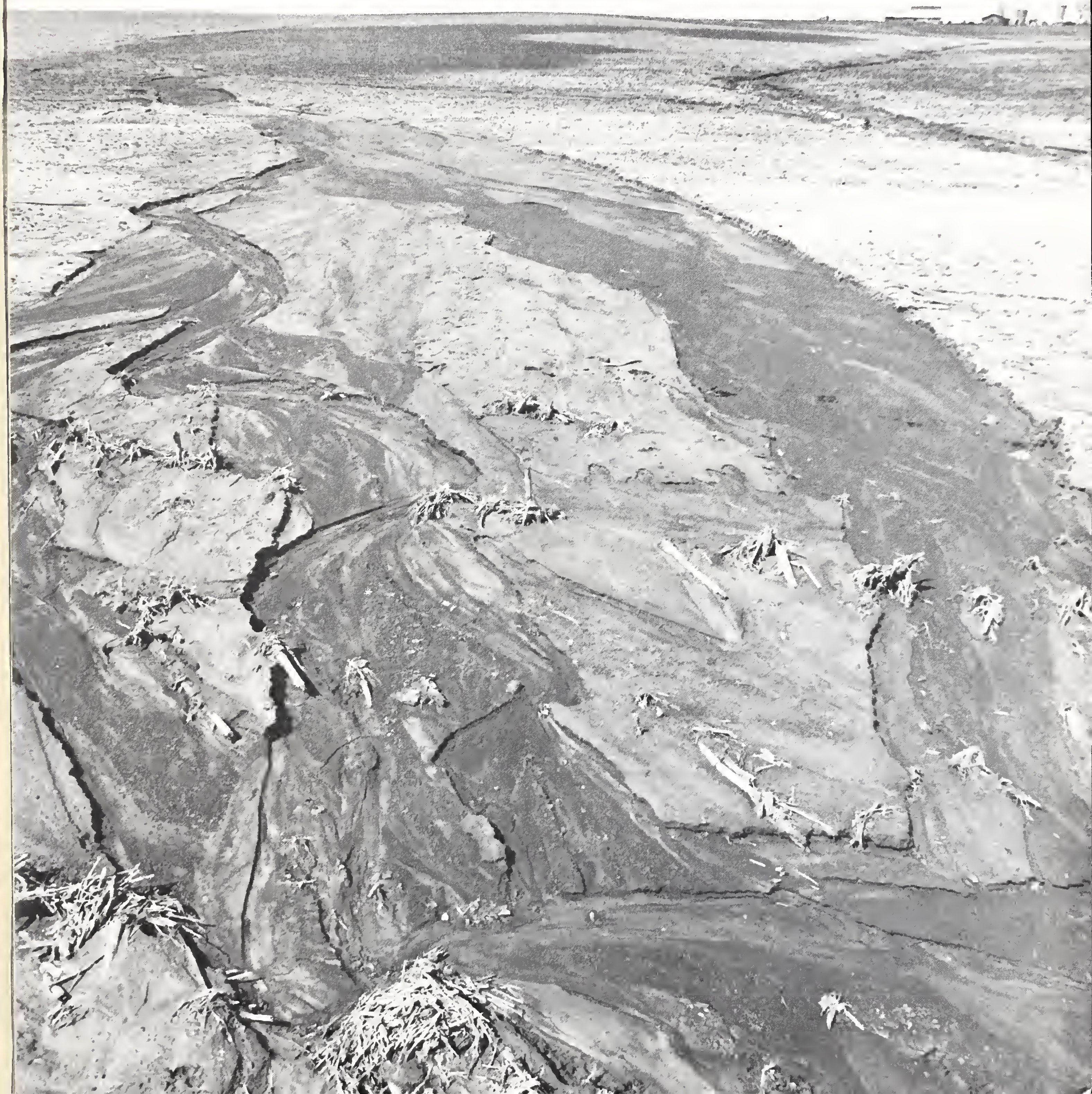

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Comments:
From the SCS Chief

Partners in Watershed Protection

We share responsibilities for carrying out small watershed projects with a number of other agencies. Some of these important allies are the Forest Service and its partners in State forestry agencies.

They can provide the specialized technical assistance that landowners need to apply forestry practices, especially in forested areas and where forestry plays an important role in the local economy.

Before local sponsors of a watershed project formally apply for planning assistance, or shortly after we receive an application, the Soil Conservation Service has agreed to call on the Forest Service and State forestry agencies to help identify resource problems on forest lands and recommend land treatment practices.

SCS also will meet yearly with State foresters to discuss all ongoing and upcoming planning or operations workloads. These discussions include sharing schedules for watershed protection and other planning activities.

In July, I met with the seven-member Executive Committee of State Foresters to discuss cooperative efforts of SCS and State forestry agencies. I was encouraged by reports of our increased partnership in watershed planning and improved working relationships.

Many watersheds have a high percentage of privately owned forest land. Properly maintaining, improving, and managing this resource can reduce excessive soil erosion and benefit the local economy.

Our shared goal is to give watershed project sponsors and landowners the best possible technical assistance in protecting and developing all of their natural resources.

Pete Myers

Cover: Sheet and rill erosion on southwestern Iowa cropland. The Soil Conservation Service recently authorized the first land treatment small watershed protection project in the State to help farmers reduce excessive cropland erosion. (Photo by Tim McCabe, visual information specialist, Public Information, SCS, Washington, D.C.)

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Small Watershed Projects

This is the last part of a three-part series on small watershed projects. Part I appeared in the August 1984 issue and Part II appeared in the September 1984 issue of *Soil and Water Conservation News*.

Irrigating Better With Less Water

The critical natural resource issue of the eighties may well be water. Will there be enough to sustain irrigated agriculture in the West? Will farmers be forced to return to dryland farming? Or, can they irrigate better by using less water more effectively?

In Oregon, a group of farmers are irrigating the same or more acres with less water. This is their success story.

Before 1977, the Wolf Creek watershed in northeast Oregon was typical of many small watersheds in the Western States. Today, it has reached the potential that exists for many western watersheds. The difference is the completion of a federally assisted small watershed project authorized under Public Law 83–566 (the Watershed Protection and Flood Prevention Act of 1954).

To irrigate the same or more land with less water, an irrigator must have better control and better management. The technology to do this is available, but cost—especially the cost of energy—holds back many farmers. Irrigators who use water supplied by the Wolf Creek project have eliminated energy costs by harnessing gravity. The result is an enclosed, completely controlled system to deliver water to the farm and a highly efficient pressurized sprinkler system, with no cost for energy.

The Soil Conservation Service assisted with project planning and design, provided roughly 50-percent cost-sharing on project construction, and helped with conservation planning and designing irrigation systems on individual farms.

The entire community has benefited from the Wolf Creek project. Although irrigation is the main purpose, the project provides multiple-purpose benefits including flood control, fish and wildlife habitat, and water-based recreation.

The Wolf Creek project provides water to 30 farmers who irrigate more than 13,000 acres. About 8,700 acres are irrigated with gravity pressure sprinkler systems, and 4,500 acres are flood irrigated.

Before the project, Wolf Creek water users did not have a reliable water source. They diverted water from Wolf Creek and other small streams in the area. Precipitation there totals only 10 to 12 inches annually. Most of that falls as snow; only a fraction comes as mid-to-late summer rainfall. Often the farmers were flooded in the spring, then had too

A small watershed project enabled Fred Colton in Oregon to adopt sprinkler irrigation.

little water for irrigation during the summer growing season when they really needed it.

Open canal delivery systems conveyed water from the source to the farms. These long canals lost more than half their water to seepage, and their banks were eroding badly. A stream of water turned into the canal at the source did not always reach the farm.

Directors and water users of the Powder Valley Water Control District turned to the Union Soil and Water Conservation District and SCS for help with their problems. To provide a dependable source of water, the water users built a dam that stores a little more than 10,000 acre-feet of snowmelt runoff from Wolf Creek and other nearby drainages.

They replaced the troublesome canals and ditches with buried pipelines that deliver gravity-pressure water to every farm in each of two pipeline service areas.

With the project, the Wolf Creek water users solved two of their three major problems—the unreliable water source and the inefficient method of delivery to the farm. They also provided the opportunity for solving the third problem, low efficiency of onfarm field application. Improving onfarm efficiency was up to the individual farmers, who wasted little time making some big changes.

Ron Pratt, Wolf Creek water user, explained how the project has affected his farming operation: "My ranch is the last outlet on the 'W–1' pipeline, and I can tell you one thing for sure—being last on a pipeline is a whole lot better than being last on a ditch.

"Before we had the project, I was using diesel pumps to pressurize my water for sprinklers. I would spend at least half my time just chasing water around to make sure I had enough to keep the pumps running. Now all I have to do is turn a valve and the water's there, already pressurized by gravity.

"I think the biggest thing the project did for me was give me the flexibility to change my operation. We've had a hay, grain, grass program. We're going to an intensified grazing program with more grass—in fact, all grass.

"I couldn't make this kind of change in my operation without the project water," Pratt concluded.

Fred Colton, another farmer in the project area, is also a director of the Powder Valley Water Control District and chairman of the Wolf Creek subdistrict. "My situation is definitely better because of the project. I irrigate more land, get bigger yields per acre, and use only half the water I used to."

Another Powder Valley Water Control District director, Bill Lewis, farms about 2,200 acres, of which 1,400 acres are under sprinkler.

"I know the project has really helped in managing our water. It's helped us save a lot of water because we used to just run it off the end of the field. We had so much waste. We do a better job now and probably only use one-third—maybe even one-fourth—of the water we used to use. I would hate to think of not having the project."

Pratt, Colton, and Lewis agreed that the most difficult obstacle faced by those who signed up to go with the project was the commitment to change. They all knew they would have to adapt their individual farming operations to fit the new water system. That transition was gradual, and for many it was difficult. It meant changing crop rotations and learning a new way to irrigate. It meant higher risks with big investments in sprinkler equipment and higher fertilizer bills.

As Fred Colton put it, "It was tough on people like me, who had been doing things the same way for so many years,

Ron Pratt, at left, checks an irrigated hay field on his farm, which is one of 30 farms benefiting from the Wolf Creek watershed project. He irrigates more than 1,200 acres of land in Union County, Oreg. At right, Bill Lewis has been able to increase his crop yields and cut his irrigation water consumption by more than 60 percent since the Wolf Creek project was completed.

to just jump in and start buying sprinkler systems. It was a big step to take."

According to Ron Pratt, a key to the success of the project was the willingness of everyone involved to cooperate and to make small individual sacrifices for the benefit of the group. Pratt cited an example:

"Some of us had ditches that delivered water to our farms. We had private use over the water in that ditch, and nobody else touched it. It was like part of our family tree! Well, we were willing to give up those ditches and store that water in the reservoir."

The summer of 1984 marked the eighth irrigation season for the Wolf Creek project. In that time, project water users have withstood the rigors of drought and economic recession.

During their first irrigation season, they were faced with the 1977 drought, one of the worst ever. Although the skimpy snowpack yielded a water supply only 68 percent of normal, everyone in the project had enough water to get through the season. Before the project, only those few who had the very best water rights would have had enough water even in a good water year.

Farmers like those at Wolf Creek who have already taken the first difficult steps away from tradition make it easier for others to follow. They have demonstrated it is possible to make a fickle water source predictable. They have shown that substantial amounts of water and soil can be saved by increasing the efficiency of delivery and field application. And they have proved, with better crop yields, that it is economically sound to do so.

Douglas A. Bishop,
public affairs specialist, SCS, Portland, Oreg.

Against Heavy Odds, Iowa Watershed Dams Do Their Job

In Iowa this past June, the bad news was that heavy rains blanketed the State and caused what Soil Conservation Service officials called possibly the State's worst soil erosion ever. For the fourth time in 10 years, erosion was widespread; about 4 million acres suffered erosion rates of 20 tons per acre or more.

The rains caused heavy flooding along major streams. Damages from wind and rain ran into the hundreds of millions of dollars, mostly in crop losses.

The good news was that report after report of damage pointed out that small watershed structures did their job, performing as they were intended to when they were built.

Watershed structures have been built in western and southern Iowa, the same area that was hit with heavy rains. "The watershed dams controlled flows and prevented some major flooding in my area," said SCS Area Conservationist Steven Stover of Council Bluffs. "None of the structures overtopped, and the emergency spillways didn't flow."

In southern Iowa, dams built as part of watershed programs and as Resource Conservation and Development projects were credited with substantial reductions in flooding. SCS Area Conservationist Erwin Aust reported the larger structures in particular saved road culverts from serious damage and prevented cropland flooding.

In northwest Iowa, in the Little Sioux Flood Prevention Project area, heavy downpours caused severe erosion on 160,000 acres. An estimated 600 terraces were damaged either by sediment or by washing or sliding out. Many watershed dams had water flowing through the emergency spillways and some dams overtopped. But, even there, SCS officials were pleased with the structures' performance.

Lynn A. Betts,
public affairs specialist, SCS, Des Moines, Iowa

Iowa's First Land Treatment Watershed Project

The Soil Conservation Service recently authorized funding for Iowa's first land treatment small watershed protection project. The main objective of the Public Law 83–566 project is to reduce sheet, rill, and gully erosion in the 44,250-acre Hacklebarney watershed in southwestern Iowa.

The watershed is in Adams and Montgomery Counties and includes several tributaries of the West Nodaway River and part of its flood plain. Sixty-four percent of the watershed is in intensive row crop production of mostly corn and soybeans.

Annual soil losses from sheet and rill erosion on 10,060 acres of upland cropland average 34 tons per acre, almost 7 times acceptable rates. Approximately 34,100 tons of soil material is eroded annually from gullies. Gully erosion has damaged 2,470 acres and continues to damage another 28 acres each year. This gullied land is considered to be permanently unusable.

Sheet and rill erosion are reducing crop yields, increasing production costs, and reducing farmers' net income. Gully erosion is destroying land and damaging fences, crossings, roads, and bridges. Sediment from sheet, rill, and gully erosion is filling road and drainage ditches and degrading water quality.

Through the watershed protection project SCS will provide accelerated technical and financial assistance to farmers with high erosion rates. The project will not control all erosion—only the most serious on lands where it is feasible. Sponsoring the land treatment watershed protection project are the Adams County and Montgomery County soil conservation districts and boards of supervisors.

Farmers will sign 3- to 10-year contracts with the Hacklebarney watershed project sponsors, agreeing to apply and maintain needed conservation systems. The project plan is designed to reduce sheet and rill erosion by about 74 percent on 8,770 acres of cropland, using soil

conservation systems on individual farms.

Conservation measures planned for the area include 250 miles of terraces; 18 grade stabilization structures; 8,770 acres of conservation tillage, mostly no-till; and 4,960 acres of contour farming. The grade stabilization structures will control gully erosion on 30 acres of prime farmland. Water and sediment control basins are planned on 4,960 acres.

"The Federal share of the cost of installing the measures will be approximately $1.8 million," said J. Michael Nethery, SCS State conservationist in Des Moines. "The project will provide $464,000 in benefits each year after all recommended measures have been applied."

In addition to reducing soil erosion, the Hacklebarney project will reduce sediment delivery to Viking Lake in Montgomery County by 7,300 tons per year. The project will also provide increased wildlife habitat and improve existing wildlife habitat.

SCS District Conservationists Brian Peterson in Adams County and Jerome Koster in Montgomery County expect farmer participation in the watershed project to be high.

"Most farmers in the watershed are already district cooperators and very conservation minded," said Peterson. "The additional technical and financial assistance they will receive through this project will reinforce the conservation they're doing now."

Dale D. Bruce,
public affairs specialist, SCS, Des Moines, Iowa

Farmers in Montgomery and Adams Counties, Iowa, will be receiving accelerated technical and financial assistance through the Hacklebarney land treatment watershed protection project to help them adopt conservation systems like this no-till corn planted on contour terraces.

Photo by Tim McCabe, visual information specialist, Public Information, SCS, Washington, D.C.

North Dakota Farmers Report Benefits of Watershed Projects

A Soil Conservation Service study in Pembina County, N. Dak., shows that flood control projects pay dividends to farmers by allowing them to plant higher value crops earlier, with lower costs.

SCS did the study in the southeast corner of the county where two watersheds with completed Public Law 83–566 small watershed projects lie next to a watershed without protective measures. Joe Porter, former SCS district conservationist in Pembina County, and Bruce Clark, the SCS agricultural economist for North Dakota, interviewed 10 farmers with fields both in the untreated watershed and at least one of the treated watersheds.

The farmers told Clark that, in the untreated watershed, they often have to plant crops 2 or 3 weeks later because of flooding. Some years they have lost entire crops because the late planting did not allow crops time to mature before a killing frost. Summer storms also flood fields and drown plant seedlings. Otherwise their yields in untreated fields are comparable to flood-free yields.

The certainty of flooding in the untreated watershed causes farmers to use more flood-tolerant and lower value crops. Often a flood forces them to leave fields fallow because by the time the fields are dry enough to plant, it's too late. In other cases, they have to reseed a field after a flood.

Most farmers reported a decrease in production costs in treated areas mainly because they no longer or rarely have to reseed a crop and they no longer have the problem of floodwaters spreading weed seeds. They said they grew higher value crops such as soybeans and sugar beets on the flood-free fields.

Clark sees the comments as firsthand testimony that watershed projects pay.

Donald L. Comis,
assistant editor, *Soil and Water Conservation News*, SCS, Washington, D.C.

News Briefs

SCS in West Recording Effects of Conservation

Soil Conservation Service personnel in the West are developing ways to document and improve the effectiveness of their technical assistance to farmers and ranchers, in response to a call by SCS Chief Peter C. Myers for such improvements nationally.

In Arizona, SCS State Conservationist Verne Bathurst responded by leading a project to develop a procedure to record the physical effects of applied conservation. SCS State, area, and field office personnel in Arizona worked together in improving worksheets that uniformly document physical conditions before and after the application of conservation practices. With this worksheet, SCS can record changes in yields, water use, labor, fertilizer application, tillage operations, and environmental conditions. The information is collected as part of and during the conservation planning process.

SCS personnel file summaries of the worksheets in field office technical guides for reference when working with farmers. A thorough knowledge of physical changes associated with conservation practices guides SCS recommendations and helps farmers choose practices.

The Pacific Northwest No-Till Association has designed an evaluation form which some SCS field offices are using for followup work with no-till farmers. The form asks for basic information about soils, slope, and rainfall, as well as specific information on the number of acres planted; previous field history; seeding rates; fertilizer, herbicide, and equipment use; yields; and soil erosion. The form also asks farmers why they use no-till and what additional technology they need to make no-till more successful.

The SCS staff at the Latah County, Idaho, field office began their evaluations last year with 45 farmers who are growing a variety of no-till crops in part of their rotations. Their data for the first year show that farmers with the best crop yields are those with enough no-till experience to master the management skills. Most farmers had yields equal to or better than conventional-till, with better erosion control. Two-thirds of the farmers evaluated didn't spray their fields for weed control before planting their no-till crops.

Ken Houska, the SCS district conservationist for Latah County, says the data support his belief that a good crop rotation and stand are important for no-till success because they help control weeds as well as disease.

SCS personnel in Latah County and Whitman County, Wash., were among those who worked with conservation districts and the Pacific Northwest No-Till Association to design the form. The association is looking for funds to hire an agronomist to manage a program in which farmers will use the form to keep the records themselves.

Bill Daley, agricultural economist at the SCS West National Technical Center in Portland, Oreg., says all the Western States are using similar procedures, with Arizona and the Pacific Northwest leading the way.

Donald L. Comis,
assistant editor, *Soil and Water Conservation News*, SCS, Washington, D.C.

Lake Erie Data Support Conservation Tillage

An analysis of data collected last year in the Lake Erie Conservation Tillage Demonstration Projects shows crop yields for conservation tillage competed well against those for conventional tillage.

The projects, first funded by the U.S. Environmental Protection Agency (EPA) in 1980, now involve growing corn, soybeans, and other crops on 1,854 plots. The National Association of Conservation Districts (NACD) is helping coordinate the projects and collect the data. The Conservation Tillage Information Center (CTIC), administered by NACD, is distributing information about the projects. EPA and NACD have jointly released a report on the 1983 data.

The report says farmers used no-till on 1,071 plots, ridge-till on 151 plots, and other forms of tillage on the rest. The no-till and ridge-till plots provide the conservation tillage results.

Differences among yields for corn were not statistically significant. For soybeans, ridge-till had the highest yields, slightly above no-till and conventional-till.

It cost farmers an average $2.68 to produce a bushel of corn on conventional plots, compared to $2.48 on no-till plots and $2.62 on ridge-till plots. For soybeans, it cost them $4.31 on conventional plots, $3.61 on no-till plots, and $3.18 on ridge-till plots.

An analysis of herbicide use revealed conservation-till farmers tend to use an additional herbicide (primarily a contact weed killer). They also tend to lower the amounts of each herbicide used so conservation-till farmers use only 4 to 19 percent more herbicide than conventional farmers. The report also says that from an environmental viewpoint, the contact herbicides most frequently used "are not considered to be persistent."

The fact that conservation tillage didn't greatly increase herbicide use means it can be an environmentally sound way to cut the sediment and phosphorus pollution of Lake Erie. Dr. Jim Morrison, a consultant for the projects, says a "conservative estimate" shows conservation tillage would halve the amount of sediment delivered to the lake. He estimates the adoption of conservation tillage on just 47 percent of the farmland in the Lake Erie Basin would achieve the phosphorus pollution reduction needed from basin agriculture. The report says conservation tillage is "considered the most cost-effective method for controlling nonpoint source pollution from rural land in the Lake Erie Basin."

Copies of "Lake Erie Demonstration Projects: Evaluating Impacts of Conservation Tillage on Yield-Cost-Environment," are available for $5 from the CTIC Field Office, 2010 Inwood Drive, Executive Park, Suite 104, Fort Wayne, Ind. 46815.

Donald L. Comis,
assistant editor, *Soil and Water Conservation News*, SCS, Washington, D.C.

Controlling Schoolyard Erosion

Red Clay Campus Goes Under Cover

Red, eroded hills and gullies that once surrounded City Park Elementary School in Monticello, Ark., are gone. In their place are rolling, grassy hills, wood-chipped play areas, and asphalted basketball courts.

Seventy percent of the $43,000 project at the fifth and sixth grade school was financed under the Resource Conservation and Development (RC&D) program, sponsored by the Drew County Conservation District and the Southeast Arkansas RC&D Council. The Monticello School District contributed the other 30 percent of the costs. The Soil Conservation Service planned and supervised the project.

Not only did the project help the appearance of the schoolgrounds, but it also helped in the classroom—the children are no longer tracking in red clay. They also have more room to play in areas where they couldn't play before, even on days following a heavy rain.

Grass—and lots of it—is the most obvious change. Tom Gentry, SCS district conservationist in Monticello, who piloted the project, says the Tufcote bermudagrass sprigged across the schoolyard is "the kind you see on many football fields. You just can't wear it out." A thousand little feet can trample it during the course of a school year, he says, and it can still be revitalized with watering and fertilizer during the summer vacation.

Grass also does its job of holding the soil in place to stop erosion on the banks surrounding and leading down to the buildings. Diversion terraces, or long built-up mounds contoured around to drainage ditches on the north side of the school, are keeping water from running down in front of the school, an area that flooded before when it rained.

Behind the school, high areas were removed to allow rainwater that constantly stood to drain away from the entrances of a trailer and mobile classrooms. An asphalt play area, walkway, and driveway were also installed behind the school.

Pine tree-shaded areas that used to be mud when it rained and bare soil when it didn't were transformed into playgrounds by landscaping with railroad ties, woodchips, and bark. The bark not only retards runoff water, but also provides a clean, unmuddied play area cushioned underfoot. Timbers and bark were also placed around the grassless areas at the base of other trees.

Diversion terraces were used to stop washouts and unsightly gullies on the southside of the campus, and a sidewalk was installed leading down to a baseball diamond. Out in the field from the baseball diamond, an area "once snaky and full of willows" was reclaimed. The children now have "an extra acre," estimates Gentry, where they can play.

The work at City Park Elementary School is one of the three critical area treatment projects SCS has handled for the Monticello School District. Gentry defines such a project as a specific area where vegetation cannot be maintained under ordinary conditions and SCS is called in to give technical assistance.

SCS assisted with a drainage problem on the playground at W. C. Whaley Elementary School by installing underground pipe and reworking the drainage system at a new junior high school, also putting it underground. Gentry says they also planted grass at both schools, put in parking lots at the new junior high, and helped survey the roads.

Changing this eroded drainage ditch, top photo, into a gently sloping grassed area, bottom photo, is one example of the conservation work done through a USDA Resource Conservation and Development program project at the City Park Elementary School in Monticello, Ark. SCS provided technical assistance through the Drew County Conservation District.

Adapted from an article by Carol Billings in the *Advance Monticellonian*.

RC&D Council Initiates Major Schoolground Renovation Project

Twelve years ago, the Coosa Valley Resource Conservation and Development (RC&D) Council, Oxford, Ala., initiated a project to stabilize critically eroding schoolgrounds. In 1982, the RC&D council celebrated the completion of the project which involved work on 145 schoolgrounds in 17 school systems. The project, focused in an 11-county area in Eastern Alabama, included critical area planting on 715 acres and installing adequate surface and subsurface water disposal systems.

The systems were composed of concrete curbs and flumes, drop inlets, tile systems, diversions, waterways, and underground pipe outlets. Vegetative treatments, such as bermudagrass planting, were used to stabilize most schoolground areas. Local funds from city and county governing bodies, boards of education, parent teacher associations (PTA's), civic clubs, soil conservation districts, and other interested groups, covered $380,000 of the project's cost, with an additional $925,000 allocated from Federal funds.

The project has controlled erosion on the schoolgrounds and has generated community pride. It has served as a catalyst to pull the communities together for a common goal, resulting in stronger local PTA's.

Throughout the course of the work, students had the opportunity to see on their own schoolgrounds what conservation practices can do to control erosion. PTA's and students at many of the schools have gone beyond the RC&D project to establish outdoor classrooms on their newly renovated schoolgrounds. Teachers and students have developed nature trails for plant identification, and some of the schools have installed observation ponds.

Ronald Burdette,
RC&D project coordinator, SCS, Oxford, Ala.

Turning Schoolgrounds Green

"If our conservation district doesn't take the initiative to show our children and school leaders how to stop erosion on their playgrounds, then who will?" said Bobby Joe Ganey, chairman of the Lasalle Soil and Water Conservation District in Lasalle Parish, La.

Ganey, along with other conservation district board members, was tired of seeing bare, eroded soil outside classroom doors so the district board initiated a project to put cover on the schoolgrounds.

The district board members talked with school principals in the parish about erosion problems on their school campuses. The district board determined that six school campuses were suffering from a lack of vegetative cover, and erosion was keeping their playgrounds bare. Board members asked the Soil Conservation Service to prepare a vegetative plan for the schools.

"Schoolgrounds get a lot of foot traffic from the students, so it was necessary for us to establish a species of grass that could withstand this problem," Ganey said.

The Lasalle Soil and Water Conservation District supplied the funds to buy bermudagrass seed and fertilizer.

"It was our intention from the beginning to have the students take an active part in establishing vegetative cover on the playgrounds," said Ganey. "In this way not only could they see the value of erosion control at their school, but they also could learn how erosion is bad for the community and for their futures."

The district board and SCS introduced the students to erosion problems through a slide show. More than 650 students from the six elementary schools participated in the erosion control work on their campuses. They helped till, seed, and fertilize the eroding areas.

To be sure that the newly established grass would be properly maintained, the vegetative plan included cutting height and fertilizer requirements.

Donny Latiolais,
was district conservationist, SCS, Jena, La.; now district conservationist, SCS, Amite, La.

A Jena, La., elementary school student receives assistance with operating a hand-held seeder from SCS District Conservationist Donny Latiolais, right, and L. W. Peppers, district technician with the Lasalle Soil and Water Conservation District. Student participation was an important part of the conservation district's project to establish grass cover on the schoolgrounds of six local elementary schools.

CONSERVATION Research Roundup

Management of No-Tillage on Poorly Drained Soils

Growing continuous corn in no-tillage systems on many very poorly drained soils has resulted in lower yields than if the land had been fall plowed. Ohio studies have shown an average reduction of 17 percent grain yield from corn grown on poorly drained soils without tillage compared to that grown on fall-plowed land when stands and weed control were equal.

Results of the long-term studies were reported by David Van Doren, a research agronomist at the Ohio Agricultural Research and Development Center, Wooster.

Van Doren and a former coworker, Glover B. Triplett, conducted experiments on a fine-textured, poorly drained soil in northwestern Ohio. Fall plowing with conventional moldboard plows almost always produced greater corn yields on this kind of land. However, there are many reasons for the increasing interest in no-tillage corn other than potential higher yield (such as erosion control, time and labor saving, or substituting it for spring plowing when fall plowing was not accomplished). The Ohio agronomists, therefore, studied management alternatives that would enable farmers to grow no-tillage corn on poorly drained soils without sacrificing as much in yields.

Van Doren said that rotating tillage on continuous corn so that no-tillage was used every other year, resulted in an average of only 5 percent lower yields than corn grown on fall-plowed land. When crops were rotated (corn followed by some other crop), yields were only 2 percent below fall-plowed corn. And if both tillage and crops were rotated, yields averaged 3 percent less than those on fall-plowed fields. In the experiments, corn emergence rate and total emergence were almost identical in both no-tillage and fall moldboard plowing with or without residues from the previous crop on the soil surface.

Van Doren says that of approximately 13 million acres of tillable land (cropland and pasture with less than 18 percent slopes) in Ohio, approximately 40 percent is suitable for no-tillage and could respond with improved corn yields under no-tillage. He estimates that approximately 20 percent of the land (mostly in northwestern Ohio) is poorly drained. The Ohio agronomist said it's not likely that no-tillage corn production will be adopted on a significant scale on the poorly drained soils. However, if farmers do opt to use it to save labor or cut erosion, proper management can significantly reduce the negative impact on yields.

Early Warning Sought for Desertification

Westerners may joke about the transfer of real estate when the dust blows, but scientists warn that rangelands and croplands can become deserts. Soil erosion, they say, is a major environmental and agricultural problem in America.

What scientists want is an early warning system that will allow people to take measures preventing desertification of good lands. Three Texas Tech University researchers have undertaken a project, in cooperation with the U.S. Department of Agriculture, to determine which indicators of change can be combined into such a system.

They will use remote sensing to study vegetation and soil changes, but they will also make ground observations to verify reasons for changes seen through high altitude photography.

The Texas Tech researchers are Russell D. Pettit, whose expertise is primarily in grazing lands; Harold E. Dregne, who has special interests in soil salinity and desertification; and John R. Giardino, who is experienced in interpreting remote sensing data. Working with them will be D. W. Fryrear of USDA's Agricultural Research Service facility at Big Spring, Tex.

They will concentrate their study on Texas ranches in two western counties (Yoakum and Cochran) where Texas Tech's College of Agricultural Sciences research has been conducted for more than a decade.

Although desertification of agricultural land is a problem throughout the world and of great concern throughout the Western United States, West Texas has special problems, in the view of the researchers.

"West Texas soils are among the most wind erodible on earth," Pettit said. "A combination of fine sand textures, high wind velocities, and historic misuse by plowing or overgrazing can cause unusually high clouds of heavy dust, especially during March and April.

"Like the land covering millions of acres throughout the world, there is a fragile ecosystem caused by the semi-arid climate and lack of plant cover."

A primary problem to date, Pettit said, is that desertification usually is noted after the damage is done. What is needed is forewarning so that it can be prevented.

"With concern growing for resource conservation and reduction of environmental pollution, better soil erosion monitoring systems must be developed," he said.

Throughout the world scientists working on the problem have suggested numerous possible indicators of approaching desertification, and the researchers hope to select the most critical indicators.

"The indicators selected should, ideally, be quantifiable, sensitive to small changes in the factor being measured, and easy to measure. The number selected should be small—a workable number that could be applied in a great many regions of the world," Pettit said.

The goal, Pettit said, is to develop methods and the technology to allow other scientists to describe and assess desertification as it occurs and to determine what processes can prevent desertification on grazed and cultivated land.

In addition to continuously monitoring wind velocities at five heights as well as air humidity and temperature, the project calls for establishment of test plots in several cropland and rangeland situations.

These include deep-plowed cropland with minimum tillage practices, cropland with no residue left, deep-plowed cropland where clay was not pulled up to hold the sandier soil, native rangeland not treated with herbicide, rangeland converted to mid-grass prairie by herbicide, and cropland with a cover crop present during the windy season.

"We hope to provide data to suggest that management strategies and not vegetation manipulation are keys to prevent desertification of sandyland systems in the American Southwest or elsewhere," Pettit said.

The project has the support of a $180,500 grant from the U.S. Department of Agriculture.

Effects of Tillage on Soil Physical Properties

Tillage of the soil has long been considered a necessary farming practice required to improve the physical conditions of the seedbed, control weeds, and improve the oxygen status of the soil profile after compacting rains. Recently, the need for extensive tillage of the soil has been reevaluated because of its high energy requirements and increased runoff of water and soil particles.

The objective of a study conducted by researchers at the University of Arkansas Agricultural Experiment Station, Fayetteville, Ark., was to evaluate the effects of long-term tillage on selected physical properties of the Dubbs and Sharkey soils. These soils occupy extensive acreage in the Mississippi Delta of Arkansas.

The sampling sites were located in Lee County in areas where cultivated and noncultivated soil of the same series occurred within 50 feet. Three cores of soil each having a diameter of 2.4 inches and a height of 2 inches were taken at 2-inch increments to a depth of 6 inches. The cores were measured for bulk density, particle size distribution, color, organic matter content, and water retained at five pressures.

Researchers H. D. Scott and E. M. Rutledge, professors of agronomy, and W. N. Miley, Extension soil specialist, report that the noncultivated soils contained higher amounts of organic matter and water retained, had lower bulk densities, and were darker in color. These are characteristics usually associated with good soil structure and imply good infiltration and retention of water, aeration, and microbial activities. The higher organic matter contents and water retained and lower bulk densities were most prominent in the surface 2 inches and decreased with depth.

Generally, the samples of Sharkey silty clay which had been in cultivation the shortest time had higher organic matter contents and water retained and lower bulk densities than the Dubbs silt loam samples. As an indication of deterioration by cultivation, the percent organic matter in the 0- to 2-inch layer was 13.8 percent in the noncultivated Sharkey and 4.9 percent in the Sharkey soil which had been cultivated 25 years. The corresponding values in the Dubbs soil were 8.4 and 1.7 percent.

The organic matter in soil is used by soil microorganisms as a source of metabolic energy and carbon. The lower organic matter content of the cultivated soils suggest a lower nitrogen, phosphorus, and sulfur content of these soils. Decreased organic matter levels are also associated with a decrease in soil structure. Organic matter affects other soil properties such as cation exchange capacity, mechanical compaction, water infiltration rates, water holding capacity, and pesticide persistence.

The higher bulk densities of the cultivated soils indicate greater compaction of these soils. Soil compaction reduces the retention and transmission rates of water and increases runoff. These changes are undesirable for crop growth.

The soils of Arkansas are the result of the interaction of climate, vegetation, geology or parent material, slope, and time. Changes in soil physical properties due to changes in the natural environment occur over long periods of time. Results of this study show that tillage over a relatively short period of time significantly contributed to the deterioration of the physical properties of these two soils.

Adapted from an article in the November–December 1983 issue of *Arkansas Farm Research*.

Researchers to Study Subsurface Bacteria

Researchers at Cornell University, Ithaca, N.Y., have been awarded $198,233 by the U.S. Environmental Protection Agency (EPA) to identify and characterize subsurface bacteria. Some of these microorganisms have the ability to degrade several industrial pollutants. More research is needed, however, to explore further the possibilities of using bacteria to help humans control the fate of pollutants in ground water.

"As yet, almost nothing is known about the physiology of subsurface organisms, how they have adapted to their environment, how they will respond to nutrients, etc.," said William Ghiorse, the project leader of the research. Ghiorse is an assistant professor of microbiology in the New York State College of Agriculture and Life Sciences at Cornell.

His research team, in conjunction with researchers at Florida State University and EPA in Oklahoma, will bring up uncontaminated bacterial samples from subsurface regions for studies in the lab, and they will place laboratory-grown microorganisms into samples from subsurface environments to study their fate. The microbiologists will also examine the response of the bacteria to various nutrients and pollutants.

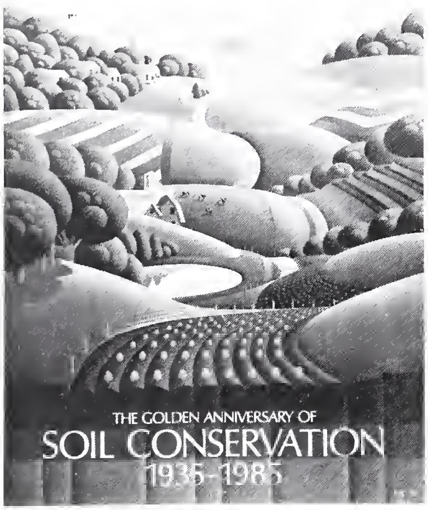
Moving?

Send present mailing label and new address including zip code to:

U.S. Department of Agriculture
Soil Conservation Service
P.O. Box 2890, Room 6117-S
Washington, D.C. 20013-2890

Official Business
Penalty for private use, $300

Artwork Commemorates Conservation



A work of original art commemorating the 50th anniversary of the soil conservation movement in the United States was unveiled July 30 by the Soil Conservation Society of America (SCSA) at its 39th annual meeting in Oklahoma City, Okla.

Jim Buckels, a popular midwestern artist whose landscapes are reminiscent of Grant Wood, was commissioned by SCSA to create the original art, which depicts a colorful, idealized conservation scene. The foreground of the artwork reveals a soil profile that leads the eye across a stylized set of conservation practices on the land, including terraces, contouring, stripcropping, and conservation tillage. A farm, a small town, and a city are integrated into the scene, suggesting the dependence of all human activity on wise land use.

"SCSA's purpose was to provide conservation-minded people with a symbol of the work by farmers and conservationists to take care of the land since the devastation of the Dust Bowl 50 years ago," Walt Peechatka, SCSA executive vice-president, said at the unveiling. "Of course, there's so much more work to be done, but this is one way people can identify themselves with the conservation movement—with an image that celebrates our accomplishments and portrays our hopes for the future."

The art is available from SCSA in two forms, a poster print for $12 and a signed and numbered limited edition print on gallery-quality paper for $75. Order from SCSA, 7515 N.E. Ankeny Road, Ankeny, Iowa 50021-9764.

50 Soil and Water Conservation

Oklahoma—A State of Firsts in Flood Control

It was 36 years ago that Hugh Hammond Bennett, first chief of the Soil Conservation Service, helped dedicate the Nation's first flood control dam near Cordell, Okla. More than 10,000 people met at the lake on Calvary Creek, a tributary of the Washita River, for the ceremony. The Washita is one of the 11 projects authorized for flood control work under the Flood Control Act (Public Law 78-534). Since that structure was built, 1,105 more have been built in the Washita River watershed.

Another "first" occurred in the State when the Sandstone watershed became the first completed watershed project in the Nation. Completed in 1952, Sandstone Creek has 65,000 acres and 24 completed flood retarding structures. Before work began on this project the area averaged nine floods a year with annual damages of more than $60,000. Eleven lives were lost in a flood in 1934.

Oklahoma was also the first State to build a multiple-purpose structure. Lake Humphrey was built in 1952 and furnishes municipal water supplies to the city of Duncan. Since that time 29 other multiple-purpose structures have been built in the State.

Oklahomans have come a long way since the first structure was built 36 years ago. Last June, more than 450 people gathered at Lake Lone Chimney near Pawnee to celebrate the construction of the 2,050th flood retarding structure built in Oklahoma (under Public Laws 534 and 566). The lake, built under PL 83-566, is one of 26 in the Lower Black Bear watershed; and, in addition to flood control, it will provide water supplies to three cities and six rural water districts.

F. Dwain Phillips
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